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## Apparatus for Diving.

Some experiments of an interesting character have been made in Paris, with a view to test the value of different diving machines and appliances. Four kinds of diving apparatus were tried—those of Mounier, Siebe, Hecla, and Erismann. All of these are constructed in nearly the same manner, being composed of a water-proof dress, terminated at the upper part by a culotte of metal, to which, when on the body of the diver, is screwed a helmet of the same metal, having affixed to it a tube for giving air, the supply of which is kept up by means of an air-pump and a valve for letting off the breath of the diver. One of the experiments tried with Siebe's apparatus, was that the diver can, of his own free will, come to the surface, by removing a part of the weight which keeps him under water. The four divers descended at the same time. One of them remained under water forty minutes consecutively, and the others a somewhat shorter period of time, picking up, during the submergence, several small pieces of metal which had been thrown down.

## Improved Stave Machine.

Barrel-making machinery is gradually attaining great perfection, and the entire work of constructing keel and other casks which do not require water-tight joints, has all been done by machinery alone. But wine, ale and water casks have not, as yet, been extensively constructed as might have been supposed, and from one simple fact, which is that all stave-making machinery which gives the necessary bevel and level to a stave has hitherto been remarkably expensive, and each machine would only perfectly cut the particular size of stave for which the machine was especially intended, and no other.

The engravings we are about to describe represent a machine that is capable of cutting any sized stave, and giving each the proper bevel and level necessary to make the cask, and its peculiarities and advantages will be appreciated from our description. Fig. 1 is a perspective view, and Figs. 2 and 3 represent the regulating devices separated.

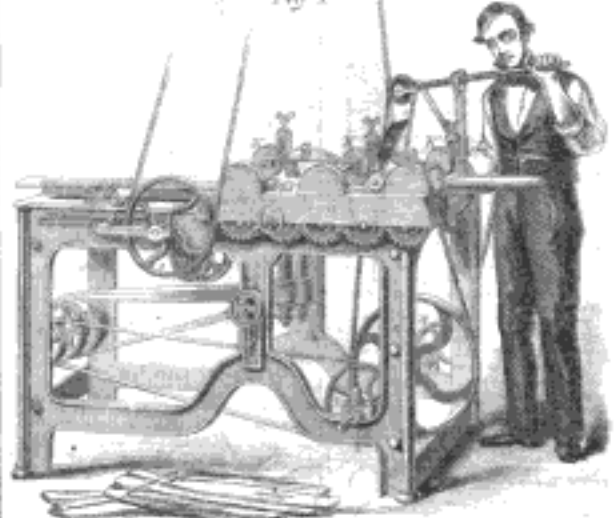
A is the frame of the machine. B the dress on the driving shaft, C, from which shaft power is conveyed to the horizontal cutters, D, one above and one below the stave, and these cut out the helms—the upper one only is seen in the engraving. This shaft also gives motion by the bands and wheels, E, F, to the vertical cutters, G, seen in Fig. 3, and their shaft, H, in Fig. 1. These are the cutters which give the desired bevel to the stave. I is a wheel, receiving motion from the main shaft of the engine, independent of the machine, and drives the gearing wheels, J, all of which, in their turn, give the motion to the feed rollers, K. L is a shield to throw off the shavings, and M a simple covering for the gear wheels, J.

On the bed of the machine, between the two cutters, G, lies the regulating device shown in Figs. 2 and 3, and which form the novelty of the arrangement. T is the shaft of L, carrying on it the cam wheel, N, in the groove of which there runs a pin, O, that is the guide

of the regulating cam, P. This P is capable of turning on the corner, R, as the cam wheel, N, is set on T, and by so doing it separates the knobs, S, which work in the angular slots, T of P. These knobs are connected with bars, U, (shown by dotted lines) fastened to

## McNISH & BUTLER'S STAVE MACHINE.

Fig. 1

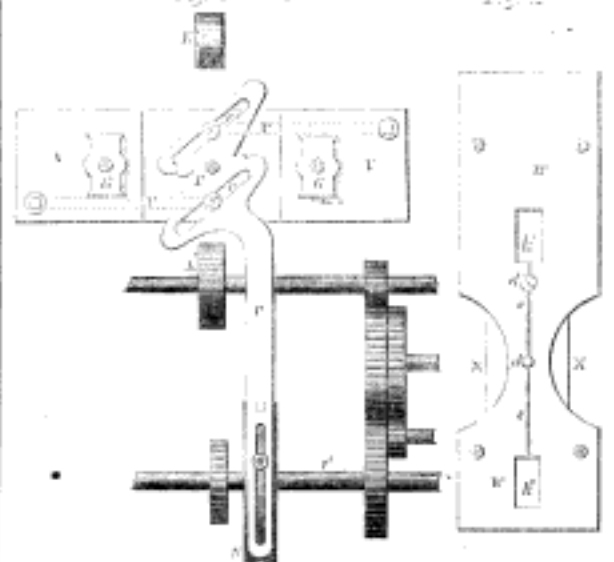


the bearings of G by the bed plates, V; as they are brought nearer together or farther apart, they will separate or bring closer together the cutters, G. Over the whole of this lies a hard steel bed plate, (shown at Fig. 2.)

and over this the stave is guided by the arrangement to be described. W is the plate of the shape represented: in the holes P' P'', at the tops of the feed rollers, K' K'', and in the recesses, X, the cutters, G, work. The plate

Fig. 2

Fig. 3



is fastened down by screws a, and in the center is a V-shaped piece of sharpened steel which holds the stave in proper position while the bevels are being cut; this is shown by c, and it is fastened by the screws, d, so that it can easily be removed for sharpening.

The operation of this machine is very sim-

ple; the stave which is to be fashioned being placed on the plate, W, the feed rollers convey it on, the bevel edges are cut, and then the horizontal cuts give the bevel, and it comes out without being once touched or moved by the operator, although every part of the machine is under his immediate control. It is

the invention of H. L. McNish, of Lowell, Mass., and one is on exhibition at the Crystal Palace during the Fair.

Any further information may be obtained by addressing McNish & Butler, Lowell, Mass., or at the Crystal Palace.

## Plated Goods.

Any metal is capable of receiving upon its surface a thin layer of another metal, and goods so prepared are called plated. Thus iron is plated with copper, copper with silver, and silver with gold, and the plating may be performed by either of two ways:—First, the oldest or amalgamation process, by which the articles are first rubbed over with quicksilver, and when perfectly covered, silver or gold foil is laid on, and rubbed in by a handisher, and then the whole is subjected to a high temperature until all the quicksilver is driven away when the silver or gold goods are polished and finished. The other process is electrolytic, by which means all the metals can be deposited from their chemical solutions on any other piece of metal or conducting body; thus, a leaf, a flower, or animal, by being coated with a conducting substance, can be covered with a thin film from the most delicate coating to one of any thickness, and can be preserved in this almighty metallic case for any period. An ingenious Frenchman has proposed to enclose human bodies in this manner, and there is no doubt it would contribute to the health of our large cities, and be more congenial to the feelings of the friends of the deceased. Nearly all the gold and silver articles of use or ornament are plated in this manner, and for the delicacy of the shade and evenness of deposit, it cannot be equalled. Of the statistics of these and a few kindred branches we can say a word, as for example: the total value of the plate, plated ware, jewelry, and watches exported from England is believed to fall short considerably of \$5,000,000. M. Fargis, the greatest manufacturer of plated goods in Paris, or France, (for this business centers quite exclusively in the capital,) who makes to the value of hundreds of thousands of francs per annum, states that while one million and a half is the amount of the internal consumption of France, the internal consumption of Great Britain amounts to thirty millions, or twenty times that of France. The French plated goods are fashioned, not in general with stamps, but, by the pressure of tools upon wood molds in the turning lathe. Some improvements have also been recently made which greatly simplify and facilitate the process of manufacture.

## The Poppy.

A letter received at the Patent Office from Germany, says, the poppy is cultivated in southern Germany to a large extent, as a substitute for sweet oil. It has supplanted the use of the imported olive oil wholly in that country. It is further stated that the soil and climate of the New England States is highly suited for the culture of this article, and they might provide the whole Union with sweet oil, and thus save a large sum of money, which goes to France and Italy.

ANOTHER EXAMINER GOES.—We regret to learn that John Galpin, Assistant Examiner in the Patent Office, recently appointed to fill the place made vacant by Dr. Brewster's resignation, died very suddenly of typhoid fever. But a few days before, he was in full health. He was highly esteemed as a man and an officer.





## New Inventions.

## The Electric Telegraph.

The Electric Telegraph is democratic. It was originally designed to be an instrument through which governments might communicate, and it was slow in being placed at the disposal of the people of large cities; but now from the centers of population it speaks alike for the sick and great, or poor and feeble, with equal indifference. And behold! loathly, it is to be applied for the advantage of the poor fisherman; certainly this is wonderful, to aid the operations of the fisherman by the application of electricity.

In the flocks of Norway, where the herring fishery is the principal support of the entire population, it is necessary that when a shoal of herrings arrives, all the fishermen should instantly have it made known to them that they may quickly have their boats in readiness. To have the boats so arranged around the boys or ferries that the fish cannot regain the open sea is the aim of the fishery. Disappointments have often occurred from the intelligence of an arrival coming too late; and the government of Norway has established along a distance of over 124 miles (the length of coast frequented by the herrings), a submarine telegraph, with numerous land stations at sufficient intervals, to communicate with the villages inhabited by the fishermen. When a shoal is perceived making for any of the ferries, a telegraphic dispatch is sent to the fishermen, and they are in readiness for the taking almost as soon as the herrings are in the fiord.

When we turn the application of science to the profit and benefit of the poor inhabitants of our globe, we demonstrate its true importance and grandeur.—*E. F. Johnson.*

## Improved Rotary Pump.

This form of pump is supposed to have some advantages over the common lift pump; and rotary ones are coming into more general use, on account of the regularity of their action and simplicity of their parts. The one herein described is an alleged improvement on the old form—the novelty consisting in the taper form of the screw, which is not so liable to wear as the ordinary shape, and also by pushing it along, it can readily be kept water-tight; and it will pump as well when the rotation is slow as when it is quick.

Fig. 1 is a perspective view of the whole, and Fig. 2 is a section through the whole, still showing the working parts in perspective. Similar letters refer to the same parts in each.

A is the barrel of the pump, B the box containing the piston, C the ends containing suitable collars, c, through which the axle of

Fig. 1



the screw passes, and D the gearing by which it is worked. E is the section pipe, and F the delivery. In Fig. 2, G is the screw, the edge of whose thread, g, is cast in one piece, so that it fits water-tight into the taper barrel, A, and H is the shaft of the screw, which is connected with the gear wheels, D. The

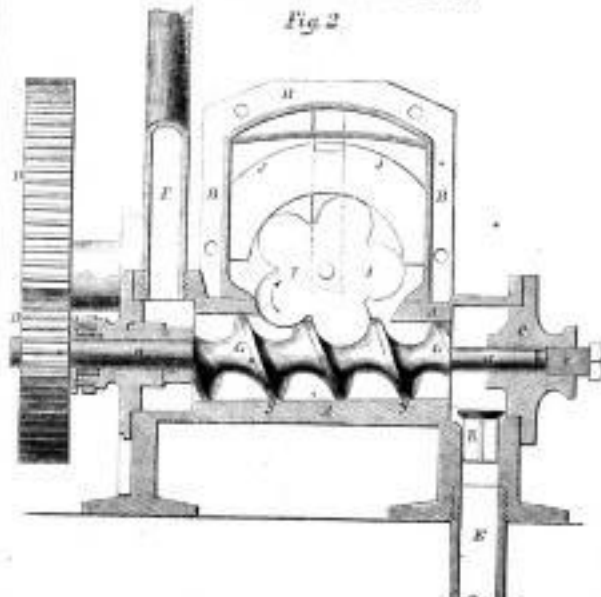
piston, the shape of whose periphery corresponds with the internal in the pitch of the screw, and it rotates in the direction indicated by the arrow. J is the cut-off arrangement, which is kept in position by a piece (indicated

by the dotted line), from one of whose ends a pin passes through the center of I; K is a valve that prevents the water from flowing back when not in motion.

The operation is very simple; when the

## RAMSDEN'S ROTARY PUMP.

Fig. 2

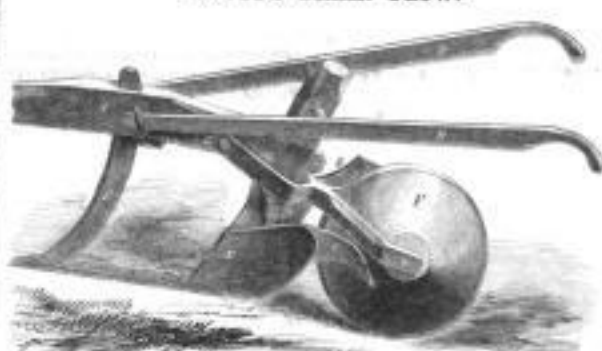


screw is turned, to use a popular expression, it drives the water up the section pipe, and brings it in contact with the piston, which forces it along the screw, and up the delivery pipe; of course, the quicker the screw is rotated, the more water will be ejected, and the

better the whole will work; but at whatever rate it is turned, it will draw up a proportionate quantity of water. It was patented the 9th of June, 1857.

For further particulars address Robert Ramsden, South Eton Farm, Pa.

## ROUTT'S DRAIN FLOW.



One of the great difficulties experienced in the use of drain plows is deep and muddy lands is that they tear away the ground, and even when they cut it smoothly, there are no means of pressing the sides of the furrows firm, so that often the whole furrow has to be barred down with a shovel and tramped up by a laborer, thus taking away much of their value as labor-saving machines. The device we are now about to describe easily and not unduly does away with this difficulty, and the method employed is extremely simple, being nothing more than the large wheel, F, seen in our engraving, which is a perspective view of the complete flow.

A is the handle, and B E the two guiding handles. G is the center which is square at the cutting point, to give a flat and smooth bottom for the water course, and D is what may be called a pullover or presser, as it fulfills all the labor by sliding along it after having been cut by the center. E is the share, and c are two adjustable pieces, one on each share, for closing the refuse mold away. F is a heavy cast iron Y-shaped wheel, which, following in the furrow, freely presses the sides into a good, compact and clean

water course. It is keyed at C, so that it can follow any inequalities that may occur in the furrow. This is especially applicable for deep lands; and, indeed, whenever a drain plow is required, this one will be found serviceable.

It was patented July 14, 1857, and is the invention of A. P. Routt, of Somerset, Va., from whom all further particulars and information can be obtained.

## Statistics of Coal.

In Great Britain, during the year 1851, there were raised about 35,000,000 tons of coal, and the value was about \$23,000,000 at the pit's mouth and \$70,000,000 at the place of consumption. There was then invested in the coal trade a capital of \$11,000,000.

It is calculated that the coal of England is of about two-thirds the value of all the precious metals raised annually throughout the world, and the mass annual cost of iron melted in England by British coal is \$35,000,000, so that the coal and iron which is made available in Great Britain is of more worth than all the gold and silver of South America, California and Australia. The worth of our

own coal is almost too vast to be estimated, and our iron is unlimited in its supply, but by some want of good management on our part, British coal and iron is still able to compete with us on our own soil.

## British Appreciation of American Ingenuity.

It is pleasant to us, denizens of the New World, observers of scenes, explorers of territories as yet unknown to any but the red men, navigators of rivers whose length we measure by hundreds not by tens of miles, builders of cities in places where, a few years ago, might was heard over forest sounds—the grovel of the bear, the blinding of the snail among the leaves, and the woodman's axe—let it be such of which now stands a mighty metropolis, whose streets groan beneath the weight of traffic, and whose wharves' sides are crowded with ships of every clime—it is pleasant to us, we say, to carry our thoughts these thousand miles away, and find that all our labor, toil, and their glorious results, have been appreciated in the Old and Mother Country. We have been led to these remarks by reading the report of a paper read before the Liverpool Polytechnic Society by Mr. T. K. Abbott, at their first meeting this season, on "The Inventions in use in the United States," and a brief condensation of this paper we shall now give. Mr. A. was surprised at our river steamers, and the *Metropolis* delighted him beyond measure; he told his hearers that on the Mississippi the Americans have 800 transatlantic mail, and that he had traveled 1,500 miles in seven days for twenty dollars! He explained the despatch exhibited by the pilots, and gave some statistical information of our traffic that astonished his audience. On our railroad system he said much, and although he found some faults, he thought that, as the whole, there was much for British railroads to copy, especially as regards the cars. The locomotive attracted his attention, but the "camel engine" was his greatest object of admiration. The hydraulic dock he thought was a master-piece of ingenuity and invention; and the water-works of Fairmount and Croton made him thoroughly perceive that he was traveling in a country whose basis was the diffusion of the steamboat century; and lastly, the American telegraph system, and the mode of conducting the United States Patent Office, were, he said, examples to the world; and he concluded by expressing his admiration of the enterprising, inventive mind of America.

This is as it should be. We like educated foreigners to come among us, and if we can teach them anything, they are heartily welcome to the information, and we are not too good to learn in return. We have, by our inventive genius, gained a position in the history of the world unparalleled in the records of nations; let us keep it. Let no people so noble stop this, at any rate, but let us, by still working in the onward and improving path, show that we can rise even superior to adverse circumstances, and, if need be, change a national disaster into a public good.

CORRIGENT PROPERTY.—According to the accounts published in the *Gazette*, of Salvador, the engineers of the Honduras Railroad Company are busily engaged in their surveys, and by the estimate already made by some of those gentlemen, it appears that the work will cost twenty-five millions of dollars, instead of ten, as estimated by Mr. Sepler.

WINE REVENUE.—France (says the *Moniteur*) contains about 2,000,000 acres of vineyards, which are estimated to yield about 80,000,000 barrels of wine annually, or about two barrels for each inhabitant; the aggregate worth of this vintage is about \$400,000,000. It should be borne in mind that the greater portion of this immense product is consumed by the French people.

Bills on all banks which are current at the places from whence sent are still received at par at this office for subscription, and for agency fees on application for patents.



## Scientific American.

NEW YORK, OCTOBER 31, 1887.

## Progress of Engineering Science.—Steam.

Last week we made a trip up the North river, with a committee of the American Institute, on board the *John Farrow*, a side-wheel boat, driven by an engine the invention of Mr. F. B. Blackford. The motive agents of this engine are steam and the gaseous products of combustion, both of which are used in the same cylinder to act on the same piston, the steam being used as the low-pressure or condensing principle. The employment of the gases of combustion in a manner to obtain useful effect from all the heat generated in the furnace is a great quantity of which escapes from the chimney of an ordinary steam boiler has attracted the attention of several scientific men, and some experiments have been made, both in this country and in Europe, in combining the products of combustion with steam, to be used in the steam engine; but so many difficulties have had to be contended with in controlling the temperatures, that no practicable results have heretofore been obtained. Mr. Blackford's improved system of operation and very ingenious improvements in the generating apparatus, generally to be very successful, so they not only effect a great economy in fuel by the very perfect combustion obtained, but, by the very perfect arrangement and proportion of the heating surfaces, the temperatures of the gases is so controlled that their admission to the engine at a temperature that would prevent proper lubrication with oil, is prevented. As, in consequence of proceedings now being taken to secure European patents, it might be prejudicial to Mr. Blackford's interests to give a full description of his improvements, we will reserve that for some future number of our paper, and merely give a brief statement of the performance of the boat and engine. The *John Farrow* is a boat of 251 tons, 125 feet long, and 25 feet beam—on properties of boats as length not calculated for great speed—while 22 feet 6 inches in diameter. The trip from New York to King's (35 miles) occupied 2 hours 31 minutes, the return trip 2 hours 39 minutes; that is, it will be seen, the average speed was about 15 miles an hour, the engine making, on an average, 18 turns per minute. Coal consumed in both trips, including that used while lying at the dock at King's for 1 hour 15 minutes, with the ordinary speed, (in which condition the consumption is almost as great as while running with the furnace closed up) was 2,174 pounds, every charge being weighed; this, most of our readers will understand to be an extremely small quantity. This is the first engine Mr. Blackford has built, except a small one for experiment, and it is under as perfect control as an ordinary steam engine; and we think he has every reason to be satisfied with the result. Mr. F. has a high-pressure engine in the Crystal Palace, but having had to take it apart to get it in, some delay has resulted in re-erecting it.

Captain Erlanson is again in the field, with a hot-air engine of improved construction, the subject of a recent patent. We have seen one, but not while in operation, in a small pleasure boat owned by J. B. Kitching, Esq., the enterprising merchant who was, we believe, the principal shareholder in the colorful ship *Reveries*, and who still hopes to see the use of steam, as a motor, superseded by air. In this engine the regenerator has been discarded; and, in place of the supply pump of the old color engine, another piston, in addition to the working piston, is, by some exceedingly ingenious mechanism, made to do duty in the working cylinder, to obtain a supply of air to the heater, so act upon the working piston. The air in this engine is not compressed before being heated, but all the power is derived from its expansion by heat. Mr. Kitching's invention, is another column of this paper, to im-

ply small engines for pumping, hoisting, or manufacturing purposes. We have never been of opinion that hot air can supersede steam as a motor, but we think that this new engine is certainly free from some of the objections to the old one, and that if anything practically valuable is to be made out of hot air, as a motive power, this experiment is a step in the right direction. We shall take occasion to examine this engine more critically, and while under operation; and we will refer to it again at some future time.

## The Steamship Adelaide.

"Hope deferred maketh the heart sick," says the proverb, and it is one which very correctly describes our feeling on learning that an important portion of the engines of the splendid steamer *Adelaide* is to be again remodelled. Little has been said of this ship for several months, but a large number of men have been at work both day and night, urging forward the completion of the valves and valve motions which were to take the place of those remodelled. It will be remembered that this splendidly modeled and staunchly constructed ship has been lying at our docks considerably over a year to allow of the completion and preliminary trials of her engines—operations which do not usually require more than two or three months. She was once advertised to sail as long ago as November of last year, and the merchants of Boston it will be recalled sent a petition asking her owners to allow her to visit that city if there should be sufficient time before she was to take her place in the line. Whenever the long and arduous new steamship *Pacific*, belonging to the rival British line, made a quick trip, the supposing anything on board, we were sometimes to believe that we had a ship ready to sail which would match, and as we finally hoped, leave her far astern. But we have thus far been disappointed. The *Adelaide* was provided with newly invented valves and valve motions which, although they had worked well on a smaller engine, absolutely failed to answer the intended purpose, or any other useful one, in this instance. After months of experiment and alteration, attended with continual knocking down, those important parts were finally discarded, and the ship, or rather this portion of the job, was transferred to the charge of another engineer. The new party was to construct new valve chests and valves, and new valve gear, and was to have the ship ready for sea on the 12th of September last. She was advertised to sail on that day. The advertisement was subsequently altered to the 26th of the same month. The ship was towed, moved to the most dock of the ship of her line, but although externally she presented the usual appearance of a ship fully rigged and fitted out, and although the fact that steam was raised in her boilers was on several occasions very apparent, still she did not start even on a trial trip, and we have now the unpleasant duty of recording the total failure of this second great effort. The new valve gear has been rejected, and a great part of it has been already removed from the ship.

The completion of this engine appears more distant than it did a year or fourteen months ago. But matters are not in an absolutely dead lock. The cylinders themselves are good, and very compactly and admirably arranged. The valves adopted in the latest series of experiments are the same as are in general use on most of our ocean steamers, and are believed to involve no peculiar difficulties on account of their size. At our latest advice the prospect was again hopeful. The engine have, it appears, been again placed in the hands of their original constructors, the proprietors of the Novelty Works, who are fitting them with valve gear similar to that which has been several years in successful use on the steamship *Argos*. We hope, though we acknowledge to some hesitation in saying it, that another "few weeks more" will allow her to prove her qualities as the ocean to the satisfaction of the millions who are interested in her success.

## Our Troubles and their Causes.

Within the short space of four years, this country has been twice thrown into convulsions. One fine morning in the month of July, 1854, the inhabitants of this city awoke and found out by the newspapers—those useful vehicles of information—that one of the Railway Kings of the country had named out to be a great success. Everybody, it may be supposed, hurried down to Wall street in double quick time, to look after the stock market, and to see how much higher paper they changed to possess. Railroad stocks, which had previously sold at extravagant prices, fell in the market like rotten trees before the wind; and, as if by magic, fortunes invested in those securities vanished into thin air, carrying ruin into many business circles and sorrow into many previously happy homes. It was then all at once discovered that railroad stocks were uncertain and deceptive—that the companies had borrowed money to pay dividends; and by many other acts disgraceful and dishonorable even to an age of recklessness in speculation, the whole financial fabric was shaken, and the general interests of industry and enterprise were paralyzed. Every man distrusted his neighbor, and said little with fear much into his own shell.

On the 26th of August last, the Old Life & Trust Company (an old institution, originally projected by a few Eastern capitalists) announced its suspension. The country had just about emerged from the calamities of 1854, and it was confidently expected that an era of good times had commenced, when the sudden failure of this old and honored institution shook the confidence of mercantile credit to such an extent that hundreds of our hard-earned business firms have since gone down—some of them to utter ruin—for the want of ability to get away to pay their debts.

We are now, to all appearance, recovering from this sudden attack, confidence begins to re-appear, and it is believed that the life-blood of business will, before long, course through its accustomed channels.

The banks, in this instance, have been the convenient scape-goats, and the public have charged them with having caused these dire evils, and thus the vicissitudes of changing fortune have fallen in a measure upon them. This very method of shifting responsibility may be all very well, but the truth is that the reckless expenditure of money for the indulgence of foreign luxuries, and the general system of credits for which there must come a pay day, have combined to bring these evils upon us. No doubt we shall soon recognize the natural spring in the American character, together with the immense productive power of the country, forbid the supposition that our troubles can be anything more than temporary ones. It is, therefore, all folly to charge any set of men or class of institutions with having produced our present embarrassments. Reaction in business is inevitable, and soon necessary to check over-trading and over-speculation. The hand of an ever-ruling Providence is clearly seen in this afflictive lesson; and the sooner we learn to regard its teachings, the sooner shall we extricate our present monetary misfortune.

## Ship's Compass.

A number of sea-captains, officers, and other persons, were specially invited on Tuesday, the 26th inst., to witness experiments with the compass, and with an improved compass invented by Calvin Klein, (who received the first prize at the Paris Exhibition—Compass of London)—for his American chronometer of 22 Wall street, this city, and which was patented on the 17th of March last. The object of the improvement is to prevent local attraction affecting the needle of the compass; and it consists in surrounding the end of the needle with a simple thin hoop of soft iron. This hoop is connected, both above and below the needle, with circular sheets of iron wire gauze, which encase the card and the magnet of the compass; but the invention is based on the hoop alone. By

taking a bar of steel, and presenting it to the pole of the common compass outside of the oval in which it is fastened, the latter was made to follow the bar round about, and thus revolve on its vertical axis. The iron hoop was then put on the compass, and the bar presented in the same manner; under this test the magnet was not moved—it still pointed to the magnetic meridian—thus showing that this simple device is a very excellent preventive of local attraction affecting the needle. This was a practical operation—the production of a visible result; and a theory of the cause, whether right or wrong, does not affect the result itself. It is believed that the magnet induces polarity in the iron hoop, and that the lines of magnetic force outside and inside of this hoop become radial, and of equal intensity, and thus the needle cannot be directed from its true meridian by large bodies of iron, such as machinery, and the iron of which the hulls of many ships are now constructed.

A timely fear local attraction in the compass, especially for steamers and iron ships, has long been a great desideratum, because many vessels have been lost by being steered out of their courses and run upon rocks, through their compasses being affected by masses of iron. We were informed that Klein's improved compass had been tried for several voyages on the steamship *Vanderbilt*, and that of record as heard it was the most reliable. These compasses are now being manufactured by Tattle & Bailey, 301 Pearl street, this city. Every instrument which measures, in the least degree, the safety of vessels at sea, is of vast consequence, as it regards the protection of life and property.

## An Encouraging Feature.

A correspondent informs us that the "New York (Ohio) Machine Works have generously presented every apprentice in their employ with a subscription to Vol. XIII, *Scientific American*," and he remarks that "a manufacturing company whose policy dictates so enlightened a consideration of the interests of their apprentice will be guided through the present financial revolution by a spirit of intelligence and wisdom which will prove adequate to the emergency. A careful examination of the weak places in their business, a judicious retrenchment at every practicable point, and thorough and complete co-operation of their employees, will inevitably carry them 'across the Rubicon' and ensure success beyond."

We certainly hope that the above may prove true. The efforts of the company above mentioned have always been judiciously managed. It deserves success.

## A Rare Chance.

To those who are extra anxious to procure subscribers for the *Scientific American*, our paper must be paid on the 1st of January, but, as yet, the competition for them is nothing like what it was last year. This is undoubtedly owing to the severity of the times, and some of the competitors will be surprised to receive three times as much money as they have sent in to us! Yet, judging from present appearances, this is not unlikely to be the case, and we assure our competing friends that we do not intend to expand; they shall surely receive the amounts to which they will be respectively entitled on the 1st of January. If the largest list does not exceed two subscribers we shall promptly pay over the \$300, \$4, \$250, etc. Who will exert themselves to get these liberal prices?

THE DISAGREEMENT between the Russian government and Col. Colt, in regard to the delivery of a large quantity of Madsen rifles, has been determined by the referees against the latter. So far as we know, it is the first case in which any government ever consented to refer a private claim to arbitrators. Under our government, victorious claimants often thus suffer great injustice for want of a simple and fair mode of proceeding like this.

# The Twenty-ninth Annual Fair of the American Institute.

During the year which has fallen this week, and the "year" combined, the attendance at the Crystal Palace has been thinner than usual; but on Tuesday, the 29th ult., a large assemblage than we had ever seen in the Palace, greeted the Hon. N. P. Banks, of Massachusetts, who delivered an address on the agricultural, manufacturing and commercial interests of the United States. In the course of the speech he made some interesting and important statements concerning this country with relation to the Old World. (See next page.)

"In Holland, in 1841, the product of agricultural industry was \$181,000,000; that of manufacturing industry, \$144,000,000; and the combined products of commerce, \$63,000,000; that of 1850, 1860, 1870, commercial industry gave but little more than a sixth part, while manufacturing and mechanics afforded 57 per cent of the entire wealth of the State. In France, in the same year, the product of agriculture was \$240,000,000; manufactures, \$100,000,000; commerce and navigation, \$200,000,000. Of its industrial product of \$1,400,000,000, that of commerce is but 15 per cent, while the mechanical arts furnish a third of the amount. The industrial product of England in 1810, was \$200,000,000, and of all other pursuits \$33,000,000, allowing to commerce a fifth of the aggregate, as in the case of Holland or France, or even a quarter part, it is still far below that of manufacturing and the mechanical arts.

"Neither in England nor the United States, in the course of 1850, is the product of commercial industry separately stated, as was the case in both countries in 1840; but it is safe to assume the same proportion, and, first, as to the number employed. There were, in 1840, 1,600,000 persons engaged in the United States in manufacturing and commercial life, of which less than one-third were in commerce. The same proportion is found in 1850 in England for the same year. In 1850, there were 2,400,000 employed in agriculture, of which less than one-third were in commerce, trade, mining, manufactures, and the mechanical arts. Deduct from this million and a half, 435,000 persons, free and slave, who were employed in mining, commerce, ocean, and river navigation, it leaves one million and a quarter of free manufacturing and mechanical—just half the number engaged in agriculture, and three-quarters of all other pursuits. Their industrial product is fabulous. That of agriculture for the present year is not less than two thousand millions; of manufacturing, three hundred millions; and in commerce a thousand million dollars—and this accompanied by an unexhausted energy, and a specific basis for its trade in the country, that, at the close of the present fiscal year will amount to nearly three hundred million dollars. Nothing less than peace will prevent the world that such people are poor. From these facts I state the elements of national prosperity to be—First, agricultural, second, manufacturing and mechanical industry; third, commerce."

Again, in speaking of the triumphs of commerce and finance, he remarked that:—

"These financial efforts are not worthy of comparison with warlike, statesmanlike and philosophical—the Rothschilds and Baring of the Old World, and Girard, Astor, Peabody, Lawrence and Cooper, of greater time in the New, under whose direction industry thrives, colleges of science and art, and public libraries are established."

On the history and dignity of mechanical power he told us that:—

"The founder of mechanical science is no less a man than Archimedes. He discovered the inclined plane, the pulley, the screw, and the lever, to which the ancient world-fathers related all mechanical powers. The labor of Galileo as a mechanic, are considered to be higher proofs of his transcendent genius than his discoveries in astronomy. He signified the pendulum, and its application to

the measurement of time. The Marquis of Worcester imparted to the world its first knowledge of the power of steam. Sir Christopher Wren was no less distinguished by his mechanical inventions than for St. Paul's Cathedral—the imperishable monument of his genius as an architect. Newton gave an importance to astronomy it had never attained by the application of mechanical laws to the phenomena of the heavenly bodies. Coulomb discovered the nature and law of friction. The clustering stars have no brighter luster than the smiling names of those who have applied the discoveries of these founders of mechanical science to the inventions of modern times, as Watt, Fulton, Whitney, Morse, Hoe, Adams, and many others.

The influence of mechanical inventions upon social life is immeasurably great, and, as an aspect of civilization, all other pursuits fade before it. We can measure the importance of recent agricultural improvements—of railroads—of the telegraph—the daguerotype and photograph—the cotton gin that eradicates the cotton crop. The sewing machine with work as great a change in the family as railroads have in commerce and States. We have seen at this exhibition a perfect work, unsurpassed in beauty of workmanship and for service, that is made by machinery, and under such roof, where the roughly swayed materials are fashioned into the perfect work in the hours intervening between morning and evening—an achievement never before attempted in any part of the world. And I understand that machinery is in progress of construction that will secure the manufacture of a perfect time-keeper, at a cost of three dollars, as are now imported at a cost of three hundred."

We proceed to notice a few of the remaining machines in the Fair, commencing with the

## POWER MACHINES.

The first that forcibly strikes us is one exhibited by Landphar & Robinson, of Erie, Pa., which is a neat and perfect specimen of its class, and compares favorably with the celebrated Blue-bird Spoke Machine, one of which (manufactured by the Newark Machine Company, Newark, N. J.) is also in exhibition. The peculiarity of Landphar's is that it places the stuff longitudinally in its means of two sets of rotary cutters, arranged above the timber to be turned, and having their bearings in revolving frames, that rise and fall, according to the profile of a plate over which they pass. Another profile plate causes a lathe-like movement of the cutter shaft in its bearings.

A combined Skingle Sawing and Planing Machine is exhibited by Yippee, Barker & Co., of Boston, that supplies a skingle which has long been wanted; the objection to ordinary saw skingles is that their rough surfaces cause them to hold water, and by being always damp, they curve up, split and decay much sooner than the shaved or planed ones. By Yippee, Barker & Co.'s device which is an ordinary skingle sawer, having a rotating wetted plate set on one side of the saw, and against which the block has to pass before reaching the saw, it smooths one side. The machine works rapidly, and the attendant says that it will throw off easily one thousand skingles per hour.

A case of beautiful wood-working tools are exhibited by E. & J. Kingdon & Co., Eagle Works, Kenosha, N. Y., consisting of chisels, gouges, plane irons, axes, etc., and we have not which to praise the most, the quality of the articles, or the taste with which they are arranged.

J. Matthews, of New York, exhibits a great variety of soda water apparatus, in the way of generating cylinders, condensers, heating apparatus and fountains, all displaying great strength and elegance in their construction.

THEY TRAVE.—In Wolverhampton, the head-quarters of a portion of the free manufacturing district of England, the weekly manufacturing in that metal average above \$5,000,000.

## PERPETUAL MOTION.

We had really thought that none were beginning to get wise, and that we had heard the last of this chimera; but we were mistaken, for the following is an exact copy of a letter we received a few days ago, and as it is a curiosity, we publish it and leave an engraving of the diagram which he encloses. The letter runs thus:—

Messrs. Editors:—I could write you a long letter about how I discovered perpetual motion; but to come to the point, I have discovered it! Below is a sketch of it. Please examine it, and tell me if I could get a patent for it.



It is a bar made to contain the water. It is a peculiarly shaped siphon; the water being made to run out of the short arm, but the water being heavier in the short arm, it flows readily. C is like any other water wheel, and is supported on pivots, D D. E is a flange by which the siphon is fixed. F is a rock to prevent the air from getting in, and F is a stopcock to shut the water off to prevent its working. The arrows show the way the water runs.

These matters are sent as truthful, and oblige, yours truly,

The Gopher student of the laws of hydraulics will at once see the fallacy of this, as the water cannot be made to flow from the shorter arm of the siphon, whenever he is weight, as the siphon does not depend on the weight of water in the delivery arm, but on the pressure in the receiving one. It is not, as one correspondent seems to suppose, a pulling force, which draws the water over, but a pushing force, which sends it through the siphon; and whatever is the form of the "peculiarly-shaped siphon," it cannot work, and does not require the stopcock, F, to prevent it from so doing. We need scarcely add that a patent could not be obtained for it. We hope our correspondent will turn his inventive genius in some direction more profitable, both for himself and the community, than seeking after that *quixotic* phantom—perpetual motion.

## PALLADIUM.

This is one of the metals found in the ore of platinum. It resembles platinum in color, appearance, difficulty of fusion, and is being very malleable and ductile. Its density is 11.8. It is slowly attacked by nitric acid, but dissolves readily in aqua regia. There are two crystals. Several alloys of palladium are known. The alloy with iron is brittle; and in the proportion of 1 per cent, it is said to improve the quality of steel for revolvers and cutting instruments. It destroys the color of gold. One part fused with six parts of gold forms a white alloy, which, from its hardness and ductility, was employed for the graduated part of the mercurial circle constructed by Troughton for the Greenwich Observatory. Electroplating with palladium is in some cases useful, it readily decomposes, and is used for chemical apparatus.

## THE SCIENTIFIC AMERICAN AS A DISCOUNT.

Having on hand a large number of sets of Vol. VI and VII of the SCIENTIFIC AMERICAN, we will forward them by mail, complete, and attached for binding, at \$1 per set and the postage (25 cents), which must be prepaid. Bound copies of the same volumes will be forwarded by express, or sold at the counter of the office of publication, at \$1 50 each.

## BAKER'S DEVICES.

H. Barker, of New York City, has invented certain improvements in bakers' cases, whereby the process of baking may be rendered continuous for any desired length of time. The dough is placed on trays or other suitable receptacles supported on carriages which are conveyed by upright endless chains through the oven, and it takes these carriages just as long a time to pass through as is necessary to effect the baking of the bread. The oven-doors are also made to open and shut and the carriages introduced into and withdrawn from the oven automatically at regular and proper intervals, and the heat of the oven is always maintained at a uniform degree. The Americans, English, French and Belgian patents of this invention have been obtained through the Scientific American Patent Agency.

## CARRIAGE SPRING.

This invention is designed to effectually prevent injury to the ordinary elliptic spring by the plucking or longitudinal vibration of the carriage-body, and also renders riding more rough and uneven roads an easy and pleasant exercise. The arrangement is very simple, and presents a neat and handsome appearance, and at the same time produces a structure which is firm and not liable to get out of repair. The improvements claimed are two auxiliary springs coiled in opposite directions in the path of vertical motion, and a horizontal central pin or support of the rock, and attached by their outer or terminating ends, one to the front and the other to the rear elliptic springs of a carriage. This device is the invention of R. R. Hood, Clinton, N. C.

## HAIRING MACHINES.

Y. J. Copes, of Cambridge, Pa., has recently made in two machines by cutting it transversely near the center of its length. By driving the body half the load can be dumped at the corner by one part, while the other can dump at the end. The object aimed at in this device is to enable the hayer to dump the hay in a wheel made long in order to dump the load. Two different materials can be carried in this wagon and apparently dumped when required.

## BREACH-LOADING FIRE-ARMS.

C. B. Whitcomb, of Ballston, and D. Tyson, of Middletown, Conn., have invented an improvement in breach-loading weapons, which consists in a novel combination of means for bringing up and seating the chamber in close connection with and discharging it from the barrel, and in guiding the same. There are also certain means of preventing the possibility of the fall of the hammer and consequent discharge of the weapon, while the chamber is raised up and out of line with the barrel.

## STEAM PLANS.

E. Ottens, of New York, N. Y., has invented a new steam plan; the invention consisting in the employment of an endless chain of plates and levers, arranged and applied to a steam traction engine, whereby a simple and practicable implement is obtained.

John P. Gray, of Fair Play, Wis., has also invented a new steam plan, which does away with the use of the traction engine, and thereby renders it lighter and more manageable; the motive arrangement being two right and left screw shafts working in the ground. It might be called a hand gauge &c.

## READING FLOWERS OR BLOSSOMS.

By the employment of an amateur bell or steel in connection with rollers attached to transposing levers, flowers may be turned or bent down both on the outer and inner edges of similar metal plates for the formation of hollow-bells, flower rings and similar uses. It is the invention of B. Howell, Louisville, Ky.

## ASTRONOMICALS.

We have to thank Commander Ties, of the U. S. Coast Survey, for maps of the coasts of the Panama, Uruguay, the Salado and Colombia, surveyed by him in the Waterwitch, 1853.



## Science and Art.

## Improved Mode of Manufacturing Sheet Metal.

H. W. Washburn, of England, has invented a method whereby he is able to manufacture lead foil quickly and economically. The process also permits to apply his improvements to the manufacture of sheet metal of various kinds, using, however, only three metals or alloys fusible at a low temperature. The lead, while molten, is run from a height into a die box, fitted with lips, so adjusted that a free longitudinal space is preserved between them for the exit of the metal. The pressure from above will cause the metal to expand between the lips in the form of a thin sheet, which is then condensed to adjacent pressing rolls, whereby it is reduced to the required thickness.

## Heat and Cold.

We are daily in the habit of associating the idea of cold with running water. Poets have called water "the cool and limpid stream," "the cool and bubbling brook," and other expressions of a kindred nature; but, great as is our respect and admiration for poetry and poets, we must now dispel the prevailing notion regarding the coldness of streams and brooks.

At a late meeting of the British Association for the Advancement of Science, a paper was read on this topic by George Rennie, F. R. S., who, in alluding to his former paper on this subject, read before the section last year at Cheltenham, stated that the subject of the mechanical or dynamic force required to raise a given quantity of water 1° Fah. had been the object of the researches of philosophers ever since Count Rumford, in his celebrated experiments on the evolution of heat in boring guns, when surrounded by ice or water, proved the power to raise one pound of water one degree, which he valued to the dynamic equivalent of 1,034 lb. M. Mayer was the first who announced that heat was evolved from agitated water. The second was M. Joule, who in 1842, announced that heat was evolved by water passing through narrow tubes, and by this method each degree of heat required for its evolution a mechanical force of 770 lbs. Subsequently, in 1845 and 1847, he arrived at a dynamical equivalent of 772 lbs. These experiments have since been confirmed by other philosophers, such as Seguin, Helmholtz, Fessenden and Favre, as the constant. In the present paper, Mr. Rennie stated that his attention was called to the subject by observing the condensation of heat by the sun in a stream, and by the heat of water running in channels. He then constructed an apparatus not unlike a patent steam, and by means of agitating water therein, was able to raise the thermometer several degrees.

This would seem to be the source of investigation, and we hope to hear more on this subject; for if it should become of any practical value, persons may—no say may—run most at a spring, and light a sugar in a bucket of water!

## Improved Coupling for Cars.

The too frequent accidents which happen to railroad trains by the engine getting off the track, and then dragging all the cars after it, have called the attention of the inventor of this improved car coupling to a method of remedy, and we are about to describe the result of his investigations and cogitations.

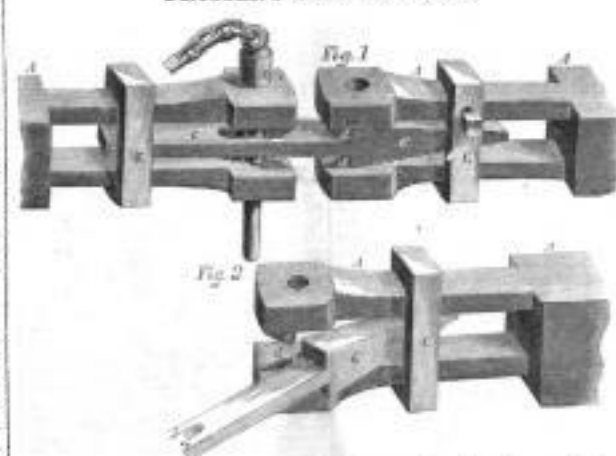
Fig. 1 shows the couplings when attached, and Fig. 2 the position when out of line, as when the first car has got off the track.

A is the couplings which are permanently attached to the car; B a pin which passes through holes in the couplings and through the coupling joint, C, which is made with a wedge-like projection on the end, the flanges of which catch corresponding ones worked inside the couplings shown at d.

The action is very simple, being as follows: The first car is fastened to the coupling joint permanently by means of the pin, B, passed

through a slot in it, and the piece, E, prevents it from shaking out. The after car is attached by means of the wedge-like catch on C, and so long as the cars keep on the track, this keeps its hold and pulls the after car along;

## PROSSER'S CAR COUPLING.



the whole train with it. If this device be attached to the engine and all the cars of a train, should the engine itself get off the track, the cars and the passengers they contain will be safe; or should the first car, from carelessness on the part of the person joining them,

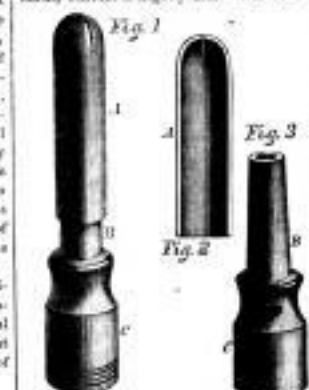
but should the former car, either by getting off the track or other means be at any angle with the after one, the joint will assume the position shown in Fig. 2, and then release itself, and not so with an ordinary coupling device.

It was patented July 21, 1857, and for further particulars apply to the inventor and patentee, Wellington Prosser, Kendall, N. Y.

## Cannon Gas Burner.

This is an improvement on the ordinary gas burner, and the inventor states that it will save one-third of the gas; and one of them placed on an ordinary four foot burner will give the light usually afforded by a six foot one.

The invention consists in the specially-cup A, Fig. 1, which is seen divided in Fig. 2; this may be placed over the ordinary foot-lamp burner B, Fig. 3. This satellite cup being fitted so to the common burner intervenes a kind of reservoir for the gas before it is burnt, wherein it slightly mixes with air. It



also gets heated to nearly the burning temperature, so that no heat is wasted, and the solid particles in the flame quickly become red hot, thus giving the illuminating power; and it may also act as a regulator of pressure, and prevent the jumping which is sometimes noticed in ordinary burners. C is the part of the burner that serves as to the gas-burner or bracket.

Further particulars and information may be obtained by applying to the inventor and patentee, A. D. Gates, Binghamton, N. Y. Patented June 30, 1857.

## In the Sun Incubated.

Sir John Herschel concludes that the sun is a planet abundantly stored with inhabitants; his inference being drawn from the following arguments:—On the tops of mountains of sufficient height, at an altitude where clouds very seldom reach to shelter them from the direct rays of the sun, are always found

regions of ice and snow. Now, if the solar rays themselves conveyed all the heat on this globe, it ought to be hottest where their course is least interrupted. Again, accounts all confirm the coldness of the upper regions of the atmosphere. Hence, therefore, even on our earth, the heat of any situation depends upon the aptness of the medium to yield to the impression of the solar rays, we have only to ad-

just that, on the sun itself, the elastic fluids composing its atmosphere, and the matter on its surface, are of such a nature as not to be capable of any successive affection from its own rays. Indeed, this seems to be proved from the copious evulsion of them; for if the elastic fluids of the atmosphere, or the matter contained on the surface of the sun, were of such a nature as to admit of any chemical combination with its rays, their evulsion would be much impeded. Another well-known fact is, that the solar focus of the largest lens thrown into the air will occasion no sensible heat in the place where it has been kept for a considerable time, although its power of exciting combustion, when proper bodies are exposed, should be sufficient to fuse the most refractory substances. Thus from arguments based solely on the supposed physical constitution of that luminary, he deduces the somewhat astonishing idea that the sun is inhospitable.

## Alloys of Silicon.

This substance, of which hitherto we mark has been known, was brought into notice at a recent meeting of the French Academy of Sciences, when they were shown some miniature bronze cannon, in which, instead of the alloy as one of the components of the bronze, silicon was used. That is, instead of 11 per cent of tin, 5 per cent of silicon entered into the composition. The properties of the new alloy are said to be quite remarkable. Its hardness and tenacity it resembles iron. It also has great ductility; and its fusibility will allow it to be applied to many uses to which bronze is not adapted. Copper and silicon give other alloys of different properties, according to the proportions. That which contains 12 per cent of silicon is very hard, and breaks with a white fracture resembling that of diamond.

Zinc has been found to dissolve in alloy with silicon, the same an aluminum does, with this advantage, that the silicon can be extracted in a perfect state, by means of the

volatility of the zinc, or its solubility in acids. Thus, to obtain beautiful specimens of crystallized silicon, put into an iron crucible at red heat in the fire a mixture of three parts of fluo-silicate of potash, one part of zinc, and one part of sodium in small pieces, and maintain the same temperature for some time. Then let the crucible cool slowly, and break it, after the contents are completely solidified; you will find a mass of zinc, permeated throughout, and especially at the top, with long crystalline needles of silicon, chapters of regular octahedrons interlacing with each other. To separate them from the zinc which envelopes them, it suffices to dissolve the latter in hydrochloric acid. This process is preferable to any hitherto known. The process which gives the alloys of copper and silicon is the same, with the substitution of copper for the zinc.

THE FUTURE.—It is estimated by a commercial journal of this city, that for the present fiscal year our exports will exceed our imports \$150,000,000, and that in twelve months from this time we shall have received satisfy from the shock of the existing pressure.

# Prospectus

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In announcing the THIRTIEN Annual Volume of the SCIENTIFIC AMERICAN, which commences on the 12th of September, the Editors and Publishers express this opportunity to thank their numerous friends and subscribers for the encouraging and very liberal support hitherto extended to their journal, and they would again re-assure its patrons of their determination to render the SCIENTIFIC AMERICAN more and more useful, and more and more worthy of their confidence and patronage. The undersigned would to the point as a guarantee of their disposition to always deal justly and thoroughly that all who subscribe to a scientific and mechanical journal which come within their purview.

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